Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington DC 20554

In the matter of:	**)**	
	)	
Amendment of Part 97 of the	**)**	
Commission's Rules Governing the	**)**	**RM-11306**
Amateur Radio Service Concerning	**)**	
Permitted Emissions and Control	**)**	
Requirements	**)**	

Comments Regarding the Petition to Allocate Frequencies in the Amateur Radio Service by Bandwidth Filed by the American Radio Relay League on 14 November 2005.

I, Albert J. Schramm, W3MIV, am a licensed amateur radio operator and a member of the American Radio Relay League. I enjoy no position or privilege beyond that of any other radio amateur of my license class, or of any other annual member of the League. The statements I put forth in this comment are my own, and they do not necessarily reflect the views of any other amateur radio licensee, or those of any group or coalition, including the ARRL.

1. Introduction

The Rule changes proposed in the ARRL petition result from "advice from an Ad Hoc Digital Committee[1] formed to advise the ARRL on issues that arise from

1 The advice of the Committee was not unanimous. Two Committee members regarded the conduct of the deliberations and the final decision of the Committee to have been defective. One resigned in protest and the other, Howard Teller, KH6TY, prepared a minority report for submission to the ARRL Board. This report was never shared with the

the development of new high-frequency digital data modes of operation, and by extensive input from ARRL members.[2]" As part of the process of soliciting members' views and opinions on the bandwidth proposal, a draft of the proposal was published on the ARRL web site, a targeted email address for comments was created, and several editorials were published in the ARRL's journal, *QST*. To the best of my knowledge, neither a total number of respondents nor an analysis of responses has ever been published by the League, but there is little doubt that many comments were received through the email mechanism. I have followed the issue with great interest, and I have read with careful attention the comments on the basic proposal that occupied many internet forums devoted to discussions and opinions on Amateur Radio topics.

I believe the ARRL's bandwidth proposal is the fruit of ideas which time have come for Amateur Radio in the United States. In general, though it seems more complex than I believe it needs to be, the basis the League presents in its petition is a good foundation, worthy of serious analysis with a view to moving forward with the recasting of Amateur Radio regulations that are better suited to the emerging realities of modern Amateur Radio's expanding potential. The very rapid growth of new and exciting digital modes that combine the power and versatility of the modern desktop digital computer with the flexibility of operation available in modern DSP-based transceivers is fostering a sea change in

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membership of the ARRL. A copy of the Ad Hoc Digital Committee Minority Report may be viewed or downloaded at http://www.zerobeat.net/bandplan_dissent.html.

2 See para 13, page 10 of the ARRL Petition.

communications techniques that rivals any previous time in the development of radio communications technologies. As at every juncture in the past, when the new swiftly began to overtake the old, a restive inertia impels many to resist every change. Such reaction is both normal and natural. Common sense states that any regulations that may be promulgated should have the benefit of simple acceptance among those the regulations seek to control, otherwise they will be ineffective. Just as it would be unwise to impose a 10 mph speed limit on a modern Interstate designed for high-speed traffic, mandating regulations that needlessly fly in the face of established use and tradition will result in more problems than solutions. The history of the 11-meter band in the United States shows this all too clearly.

2. Discussion

The fundamental locus of much of the negative attention and concern about this specific petition seems to lie in the growing use of WinLink 2000, and in the potential for serious interference that may result with widespread, unrestricted use of this or similar "store-and-forward" communications protocols throughout the high-frequency bands. Much of the outrage expressed by the most vocal critics centers on WinLink 2000's reliance on PacTOR (particularly PacTOR III—a digital communications protocol typically about 2.4kHz in bandwidth and not readily decipherable except by costly proprietary hardware) and on the transmission of email traffic that many insist could as easily be confined to the commercial internet in most cases.

WinLink 2000 (hereafter WL2K) is a valuable and fast-growing tool, especially for emergency communications above 30MHz. The value of new ideas of every sort is measured by their acceptance, and by that measure alone, WL2K must be accorded great success, particularly with regard to its applications by a growing number of emergency communications networks among Amateur, public and private agencies and associations. While most of the value of WL2K as an emergency communications tool has been realized in the VHF/UHF spectrum, it is also showing itself to be fairly robust and efficient for some uses on high-frequency bands over greater distances than are often achievable above 30MHz, this despite the anomalies of high-frequency operation that often render many digital modes ineffective. By most measures, WL2K has proven itself to be an important and effective tool of a type that needs to be accommodated by any revision of the regulations governing the Amateur Radio Service.

If there is any serious deficiency to WL2K and its reliance on PacTOR protocols for operations, it is to be found in a wide bandwidth and in the "horizontal" nature of the system demanded by the PacTOR protocols. Though now regarded as "obsolete" by many, HF Packet operations were developed to handle several users within a vertical, or "serially interleaved" hierarchy in which the individual message packets are identified by session and user so that multiple users may participate on the same frequencies at the same time. Conventional HF packet is conservative of spectrum. Using the conventional AX.25 protocol, Packet operations may be seen as too slow for heavy message traffic, yet with advancements like the Q15X25 protocol, throughput may actually rival PacTOR's

best performances. WL2K's reliance on PacTOR (regardless of which iteration of the protocol is chosen) cannot accommodate multiple users on the same frequency at the same time. Each user's message traffic must clear fully before the next user can access the mailbox (PMBO), an enforced wait that may prove frustrating to many users when all of the PMBOs within their reach are busy. Since each PacTOR link must occupy its own frequency channel, this multiplies the amount of spectrum demanded by the operation of several simultaneous PacTOR III links substantially. Though the present level of WL2K use is limited, the growing acceptance of this system means that its use will grow at an accelerating pace. As this growth takes place, each new WL2K PMBO will require its own separate "channel" of somewhat more than 3 kHz, which it will guard for traffic directed to it. Given that these PMBO "robots" have demonstrated little evidence of any facility to determine the presence of existing traffic on their frequency channels, the potential for interference becomes significant. Worse, HF propagation characteristics are such to argue that any interference will often be international in nature.

The potential interference could be made more tolerable were the transmissions causing the interference to have a clear and demonstrated emergency nature, or even some essential and fitting amateur radio purpose. The fastest growing use of WL2K on HF bands, however, is anything but vital. Most of the users are employing WL2K and amateur radio licenses to avoid the need to pay for readily available commercial "email-over-HF" services, such as SailMail and other commercial providers, and the promoters of the WL2K system have

gone so far as to solicit new users through advertising and notices in sailing, travel and recreational vehicle magazines. While this may not be specifically illegal according to current FCC rules, it is clearly at odds with the spirit of the Part 97 regulations regarding the commercial uses of amateur radio. The end result of NPRM&O 05-235 can only accelerate the growth of this pseudo-commercial application over the next few years.

Though clear and compelling benefits may be derived from some combination of radio-linked internet communications, they will probably be the result of newer and possibly wider bandwidth protocols in the years ahead; no one has yet devised a way of stuffing more content into a message and increasing the speeds of transmission without occupying more and more bandwidth. If advancement is to occur without adding to both the regulatory burdens of the FCC and also avoid the imbroglios that often result from interference on increasingly crowded HF bands, such operations either must be restricted to frequencies above 30MHz, or to sub-bands solely dedicated to their use. Such sub-bands are now designated for automatic, store-and-forward operations, and these sub-bands should be expanded to accommodate the so-called "semi-automatic" operations detailed in the ARRL petition, for in the final analysis there is no material difference between them.

- ***Unattended Operations at a Distance.***

Due to the nature of High Frequency propagation, unattended operations by remotely operated mailbox systems can result in serious interference problems in

ways that can only be controlled or avoided by regulation. Informal band plans and so-called “gentleman's agreements” are too easily disregarded without serious consequence, and experience shows that these mechanisms are rarely effective during times of extremely dense traffic (such as during popular contests or peak holiday periods).

The problem is an easy one: A conscientious operator will listen before beginning any transmission. This is a fundamental courtesy that nearly all operators employ as a matter of course. But, it is not a “fail-safe” system without a human operator at *each end* of the channel. Consider a simple scenario:

> I am located in Ellicott City, Maryland, and I call a station in Saint Louis, Missouri. I am able to hear traffic clearly and easily determine that I am not interfering with anyone within the range of my transmitter. To my surprise, however, the station in Missouri may inform me that our QSO is interfering with net traffic now taking place in Portland, Oregon, which is entirely outside of my range of “hearing.” If, instead of using phone for my traffic to Missouri, I employ a digital link to call up a mailbox at that location, there is no way for me to know that my traffic will interfere with the Portland net, and the interference I cause will be worse than that of an ordinary phone QSO because nobody in Portland will be able to break in and warn the Missouri “robot” that we are causing interference to their net. The result is anger and frustration in Portland at the disruption of their net, and they probably won’t even know who caused the interruption

of their traffic, thus remaining vulnerable to future such occurrences.

As the control operator I have an obligation to "ensure the *immediate* proper operation of my station, regardless of the type of control I am exercising.[3]" "Proper operation" includes the *deliberate* avoidance of causing *any* interference, unintentional or otherwise.[4] I added emphasis in those sentences to underscore the importance of paying proper and close attention to the responsibilities of the control operator. Yet, *if I am unable to monitor effectively at the remote location, I may be causing such interference wholly without my knowledge or intent. This is nothing less than an abdication of my responsibilities as a control operator*. The station(s) being interfered with, however, may find cold comfort in my excuse for violating the rules. In such an instance, the Rules must provide more than guidance: the Rules must provide relief.

The ARRL's decision to modify §97.221(c) by removing the current 500Hz maximum bandwidth restriction on the remote operation of unattended systems will prove disastrous as more and more WL2K (or similar systems) become operational—it is important to realize that, while WL2K, itself, is a "membership" organization that seeks to regulate the location and operation of member PMBOs, there is nothing to prevent the addition and multiplication of other such systems

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3 §97.105(a) The control operator must ensure the immediate proper operation of the station, regardless of the type of control.

4 §97.101(b) Each station licensee and each control operator must cooperate in selecting transmitting channels and in making the most effective use of the amateur service frequencies. No frequency will be assigned for the exclusive use of any station....
(d) No amateur operator shall willfully or maliciously interfere with or cause interference to any radio communication or signal.

employing wideband digital protocol robots once this rule has been amended. The 500Hz bandwidth limit imposed by that section was the result of careful analysis of the needs of the time. That bandwidth was sufficient to include then-current protocols in use on the amateur service frequencies. Today, protocols up to 2.4 kHz are proposed for remote, unattended operation, thus the ARRL petition now seeks to remove the narrower limit to accommodate these newer protocols, though the resultant gain in "throughput" of message content does not rise linearly with occupied bandwidth[5]. The result of this removal without a compensation in the rules, however, will clearly be a drastic increase in the potential for interference, all the more so in light of the recent regulatory proposals that will probably result in a higher density of operators on HF bands, most of whom will be using the very same bandwidth categories in which the remotely controlled robots will operate. I believe that it will prove to be a serious error for the FCC to acquiesce in this change.

In presenting the rationale for this rule change, the ARRL states: "The existing bandwidth limit of 500Hz applies only to automatically controlled stations where the station is responding to interrogation by a station under local or remote control. See 47 CFR §97.221(c). In fact, in the band segments proposed in the attached Appendix to be limited to 200 or 500 kHz [sic], there is greater protection proposed for narrowband emission modes than exists today. [footnote

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5 PacTOR III seems to yield approximately 30-35% gain in message throughput over PacTOR II in HF operation, but occupies 500% more bandwidth to do so. It also seems to be somewhat less robust on HF than PacTOR II. Ironically, PacTOR II would satisfy the bulk of WL2K's messaging needs and fit within the current Rules without change.

omitted].[6]" This statement is disingenuous, at best, and hints at an attempt to obfuscate an otherwise clear fact: the issue is not, and must not be, one of safeguarding narrowband modes, *alone*, from such interference, *but of safeguarding any and all modes of operation on the amateur service frequencies from interference by robot transmitters responding to remote interrogation with protocols occupying bandwidths of up to five times the present §97.221(c) limit*. The FCC recognized its responsibility to shield the bulk of amateur service frequencies from interference by automatically controlled operations when it set aside specific frequencies for their operation in 1995.

To repeat, the plain fact is that there is no material difference between automatically controlled operations and remotely controlled unattended mailbox operations *at a distance*. The remotely controlled unattended mailbox operations result in the very same type of interference the Commission then sought to ameliorate. The change the ARRL now requests would turn that decision on its head and effectively throw open the HF bands to unattended/remotely controlled transmitters each using up to 500 percent greater bandwidth than permitted under the present Rules.

Indeed the interference threat to HF operations that even the present Rules will present in light of both the potential fruits of NPRM&O 05-235 and the potential for swift growth of new PacTOR II (or other) robots operating

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6 See Para 13, page 11 of ARRL Petition. The omitted footnote refers to a voluntary band plan which was not revealed at the time of filing this Petition.

unfettered by an *unrevised* §97.221(c) limit calls into question the wisdom of retaining the present 500Hz limitation, at all. A strong case can be made that *all* remotely controlled "store-and-forward" mailbox operations should be carried out within guarded sub-bands and simply regarded as automatic store-and-forward systems, which they are at a distance on HF *in effect if not in name*.

The mechanism already exists to permit wide-band emergency communications access to frequencies outside of the sub-bands designated for their use on an "as needed" basis when such operations provide an important and needed public service during times of clear and compelling emergency. These instances are sufficiently rare to preclude open access to "any open frequency" on any other basis.

In the most recent instances of serious emergencies in which amateur radio played a significant role, email message systems such as WL2K played an insignificant part, if any at all. Reviewing the various media reports lauding amateur efforts in the horrendous Indian Ocean tsunami and the devastation resulting from hurricanes Katrina and Rita, emergency communications were provided by amateurs using CW and SSB phone on HF, and FM handsets, mobiles and repeaters on VHF systems. I have found no mention of WL2K or email over HF systems in use during these events, even though the ARRL and WL2K have both touted the development of emergency communications systems employing the system.

The plain fact of the matter is that WL2K is just another store-and-forward system of very limited application during fast-changing emergency needs. When the requirement is for the timely delivery of important information, such systems are dependent upon the internet service providers handling the emails, and on the immediate presence of a recipient to open, read and respond to the email. Instead of a step forward from ordinary HF packet operations, which employ a "mesh" topology to link multiple mailboxes for the handling of serially interleaved messages, WL2K may be seen as a step backward in that each transmitter must acquire a PMBO individually to pass its traffic, thereby holding all other traffic for that PMBO until that transmitter clears that message and the next message can begin. A failure of one PMBO will bring result in further delay of the traffic. Taken together with the resultant delays in forwarding and delivering the email traffic over an available internet link (which mostly depend on hardwired infrastructure, which is itself susceptible of severe damage), the touted speed may be seen as little more than a marketing fiction. Worse, the only means of increasing message handling capacity is to add more PMBOs (unlike ordinary HF packet, which can pass additional traffic by rerouting and/or increasing density in a mesh topology utilizing a number of stations simultaneously), WL2K's only recourse is to add more PMBOs, each on its own frequency channel, thereby increasing the potential for more interference on already limited HF bands.

Some Thoughts on Band Plans

Should the FCC favorably consider the ARRL petition now under discussion in this comment, the Band Plan that will overlay the fundamental frequency bands and sub-bands delineated in the petition will assume an importance that is arguably greater than the usual voluntary guidelines published by the ARRL and accepted by most Amateur Radio Licensees as "just short of law" today.

In FCC 04-79, the Commission dismissed an appeal to make voluntary band plans a more formal part of the Rules, noting "that the voluntary nature of the band plan allows amateur service licensees the flexibility to make any changes if and when they are needed to reallocate the spectrum among operating interests as new operating interests and technologies emerge or certain operating interests and technologies fall into disfavor.[7]" The underlying rationale for this statement is exactly correct, it seems to me, and I believe that the Commission was correct in rejecting a proposal to incorporate a band plan into the Rules, *per se*. There is still an advantage to be gained, however, from giving such "voluntary" band plans the "force of law," while retaining all of the flexibility necessary to adapt it to changing conditions without the active intervention of the Commission for every alteration. The present methods of determining, approving and publishing band plans thus could be retained while adding some additional "authority" to these informal rules that may prove valuable in the near future.

Given the potential expansion of the numbers of Licensees operating on HF

7 See paragraphs 32-34, page 18 of FCC 04-79, WT Docket No. 04-140.

bands that might result from any Report and Order issued as the final distillation of the decisions contained in NPRM&O 05-235, and the elevated potential for interference that may be a consequence of a sudden influx of new operators unaccustomed to the peculiarities of HF propagation, I urge the addition of a clause to §97.101(a) that will give a Band Plan more weight under the rules, yet retain the flexibility and ease of alteration now inherent in the current Band Plan as maintained and published by the ARRL. I offer the following suggestion:

> **§97.101 General Standards.**
>
> (a) In all respects not specifically covered by FCC Rules, each amateur station must be operated in accordance with good engineering practice and good amateur practice, which shall be interpreted to include adherence to any Band Plan in effect for the IARU Region in which such operation takes place.

Such an amendment[8] offers no additional burdens to the Commission beyond those already inherent in the "interference" clauses already in the Rules, but would clearly demonstrate the Commission's serious interest in maintaining order by underscoring the importance of preventing every instance of interference, *even when unintentional*, when it is practicable to do so. No less important, this addition to the Rules would not materially alter the way band planning is now carried out and enacted as technologies and operating style and modes evolve over time.

In Conclusion

Bandwidth allocation, itself, is a good idea, and it is long overdue to make the

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[8] A similar request was denied by the Commission in 1998 on the basis that the FCC considered the inclusion of such a definition of §97.101(a) as redundant and unnecessary since intentional interference is already against the rules.

change from mode allocation. The fast pace of new digital developments, especially those employing common soundcards in the nearly ubiquitous personal computers now a part of the vast majority of amateur stations, is a large part of the future of amateur radio. For much of this ongoing research and development, narrower bandwidths with reduced errors and interference have been an important goal. It would be, therefore, a significant error to step backward by removing the current limit of 500Hz imposed by §97.221(c). Employing PacTOR II, at 500Hz bandwidth, WL2K operations may proceed under this current rule without change, and the minimal improvements that may result from the use of PacTOR III, at 2.4kHz bandwidth, should these marginal improvements be seen as desirable enough to promote increased use of the wider mode, will best be obtained without exacerbating interference problems by expanding the current automatic operations sub-bands to 10kHz or 12kHz (where possible, depending on available spectrum) and restricting WL2K and all other store-and-forward operations to these sub-bands.

With the exception of those objections I have cited in the above paragraphs, I support the goal of the petition, and would hope that the FCC will put forth a Notice of Proposed Rule Making and Order that adopts the basis of the petition, shorn of the potential for interference. I am pleased to note that the ARRL's petition conforms broadly to the Band Plan adopted by Region I and put into effect on January 1, 2006, and I believe this could be a positive step for the future of amateur radio in the US.

Recommendations

Approve the basis of this petition with the following changes, as a minimum:

- Remove the current 500Hz exemption for remotely controlled operations that is authorized in §97.221(c). All such operations can be carried out within the 500Hz sub-bands that are set forth in the petition. The bandwidth of PacTOR II operations will conveniently fit within these sub-bands, and practical demonstrations have shown PacTOR II to be far more efficient in actual operation on HF, in terms of bandwidth occupied for data transmitted, as the far wider variant, PacTOR III.

- Retain the current sub-bands set aside for automatic operation that are detailed in §97.221(b), and require that all remotely controlled operations be carried out within these sub-bands, or in the 500Hz sub-bands as listed above. This change to the petition's request will permit the operation of PacTOR III within these sub-bands when such operation is desired.

Thank you for the opportunity to comment on these important proposed changes to the Rules governing the Amateur Radio Service.

Albert Schramm, W3MIV